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THE ROLE OF KINETOTHERAPY IN THE RECOVERY OF ELBOW TRAUMA - EPICONDYLITIS IN PERFORMANCE SPORT

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Abstract: *This paper presents the most effective ways of early and systematic application of kinetotherapy means and procedures to re-educate the functionality of the elbow. Movement therapy comes into action simultaneously with the other recovery means, within the general therapeutic plan, without excluding other therapies. The treatment of medial epicondylitis caused by overuse of the forearm muscles is a concern for the functional recovery of the elbow. The treatment of functional recovery of the elbow through physiotherapy is based on the functional re-education for the fastest return to the daily activities and sports of the patient. In addition to its curative role, physiotherapy, influencing a series of pathophysiological links, also has a preventive action, by improving the muscle tone of the arm, toning both the muscles of the forearm and the arm and stretching the epicondylis elbow tendons.*

Key words: *elbow, therapeutic protocol, epicondylitis, kinetotherapy.*

1. Introduction

The existing means for applying physical therapy in diseases caused by overloading the forearm muscles, also called epicondylitis are extremely varied.

The upper limb is an extremely important part of the musculoskeletal system that integrates the body into the environment, solves the needs of human intervention in all areas of activity and can therefore be considered a true extension of the cerebellum, solves the grip and approach and distance body objects is a means of communication and expression and contributes to locomotion [3], [4]. The elbow joint is part of the upper limb, so it has the same role.

Impairment of any kind of elbow leads to major damage, so physical therapy is extremely useful in the prophylaxis, treatment and recovery of inflammatory diseases of the upper limb [1].

In performance gymnastics, performance has increased, and due to the performance required, athletes tend

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to train more, more intensely without rest needed to restore joints and muscles, which causes the frequency of injuries during training to increase due to overload body.

Epicondylitis is an inflammation of the tendons that is inserted on the humeral epicondyles (the humerus being the bone of the arm that, through its distal extremity is at the elbow) and is the result of high-performance sports activities or the pursuit of daily activities. Numerous muscles of the forearm, especially those that control the extension, flexion, and rotation or prono-supination of the hand and fingers, are connected to the epicondyles. These muscles are required in the practice of certain sports, such as tennis, climbing and golf, but also through the many gestures of daily or professional life [9].

The medial epicondylitis is caused by overuse of the muscles and tendons of the forearm and elbow.

2. The Notions of Anatomy and Physiology of the Elbow

2.1. The upper limb joint

The joints of the upper limb can be divided into two major groups: the joints of the scapular girdle and the joints of the free limb itself. The latter category includes: scapulohumeral joint, elbow joint, radioulnar joints, hand joints and finger joints [5].

"Three bones participate in the formation of the elbow joint: the humerus, the ulna and the radius.

For this reason, theoretically at this level 3 joints can be described:

• humero-ulnar;
• humero-radial;
• proximal radioulnar" [5].

a) The upper radio- articular joint:

The superior radioulnar joint, i.e. the proximal one, is made between the medial articular surface of the radial head and an articular ring of the ulna, formed by the radial incision of the ulna and the annular ligament.

The annular ligament is a fibrous blade that attaches to the anterior and posterior edges of the radial incision of the ulna and surrounds the lateral surface of the radial head. The annular ligament and the radial incision of the ulna form an osteo-fibrous ring, which fixes the radial head in the radial incision of the ulna.

The square ligament is a rectangular ligament and with this ligament is connected the lower edge of the radial incision of the ulna to the neck of the radius.

This joint, the proximal radioulnar joint is included in the elbow joint capsule.

b) ***The humerus joint:***

The humeroradial joint is made between the humeral trochlea and the crescent incision of the ulna. The olecranon fossa and the coronoid fossa on the humerus, the olecranon and the coronoid process of the ulna also participate in the formation of the joint. Its articular surfaces are covered with articular cartilage.

c)The humeroradial joint:

This joint is made between the humeral condyle and the radial cup, which are covered with articular cartilage.

In the humeroradial joint, flexion and extension movements can be made, which are performed by movements of the ulna, on the trochlea of the humerus, on the head of the radius and on the condyle of the humerus.

The joint of the humerus with the ulna and the radius, represents a trochlear joint, here movements are performed only in one plane. Because the physiological

considerations (functionality) prevailed over the anatomical ones, it was agreed by most authors that in the elbow joint two joints should actually be recognized:

– The joint of the humerus with the bones of the forearm (humeroanterobrachial);
– The joint between the proximal extremities of the radius and the ulna (proximal radius) [5].

2.2. Motor muscles of the elbow joint

The motor muscles of the elbow are divided into three groups and are: anterior, external and posterior muscles.

Motor muscles can be classified as flexor and extensor muscles, meaning that they help flex and extend the arms. The flexor muscles are the brachial, brachial biceps, brachioradial and medial epicondylar muscles (flexors and pronators), and the extensor, brachial triceps, anconeum and lateral epicondylar muscles (extensors and supplants) [2], [7].

The elbow muscle complex consists of three muscle groups with distinct functionality:

- Periarticular muscles, which provide
- functional connection between the scapular girdle and the forearm [8];
- Periarticular muscles, which provide
- the functionality of the elbow, hand and fist;
- Monoarticular muscles, which provide
- elbow stability.

3. The Elbow Joint Functionality in Sports

From a functional point of view, the elbow fulfills four functions that can practically be called:

- The elbow for support;
- The elbow for strength;
- The elbow for speed,
- Ethe ebow for finesse.

The elbow for support - Exercises with support have the effect of joint compression by compression, hyperextension and joint volgus. The elbow for support is very important in sports gymnastics, especially in parallel bars and rings.

These demands may underlie the occurrence of micro or macrotraumatic injuries, such as*:*

Microtraumatisms:

- Epicondylalgia: humero-radial
- arteropathy;
- Epithrochlealgia: epithrochleitis,
- capsuloligamentary extensions and calcifications;
- Insertion tendons of the biceps,
- bursitis and triceps, calcifications;
- Osteoarthritis.
- Macrotraumatisme:
- Posterior elbow dislocations;
- Fracture of the corneal process;
- Anterior dislocation of the radial head;
- Disintegration of bicipital tone;
- Olecranon fracture,
- Supracondylar fracture.

The elbow for speed **-** Elbow for speed participates in the circumduction movements of the upper limb where the amplitude of the movement and the linear speed of the extremity of the functional chain guarantee a high-performance gesture.

Many sports gestures, such as throwing the spear, handball, golf, tennis, appeal to the elbow for speed under the functional domination of the shoulder: the movement of the shoulder inducing whip movement of the forearm towards the racket or cross***.***

The elbow for finesse - It's a skill and it essentially depends on the hand in activities where accuracy is important, such as table tennis, but also in artistic sports in which it

expresses grace, feeling. These sports are: dance, figure skating or rhythmic gymnastics.

The elbow for strength - Elbow for strength it is used for traction in mountaineering sports, climbing or bar suspensions, for push-ups used for push-ups or weightlifting and for strokes such as boxing objects, karate strokes or full contact.

4. Kinetic Procedures in the Recovery of Epicondylitis

"The treatment is based on performing regular exercises, which will later stimulate the body's healing response. Among the healing methods are acupuncture and cortisone therapy, which consists of administering cortisone and lidocaine injections, but their effect is short-lived. Surgical treatment is recommended in less than 5% of cases" [9].

"Physiokinetotherapy is an extremely important adjunct in the drug treatment of these diseases. There is currently no specific treatment based on scientific studies for this condition. The recommended treatment is to rest for an average of two weeks and avoid activities that intensify the suffering.

Wearing orthoses can relieve symptoms, but do not solve the cause.

Drug treatment with non-steroidal anti-inflammatory drugs is effective in milder cases " [10].

"After the remission of pain, the patient can start a physiokinetotherapy program with daily execution of stretching exercises for the tendons of the flexor and extensor muscles" [9].

Laser therapy, galvanization, electro stimulation, and ultrasound are also indicated for medial epicondylitis, with some patients describing improvement after these procedures. Thermotherapy (heating the affected area) which is recommended before performing stretching exercises or cryotherapy (cooling the area) which is performed after a set of demanding exercises can also be used. [10].

Exercise or physical therapy should be further enhanced by proper flexion of the radiocarpal joint, elbow, shoulder and forearm [8]. Exercise is usually performed until the onset of pain (this being the most important indicator for the progressive increase and decrease of stretching). The most demanding movement for the tendon is the eccentric stretch.

The main benefits of treatment:

- Relieving and even eliminating pain in epicondylitis;
- Preventing and combating local inflammation
- Increased joint mobility;
- Progressive development of movements
- complex and dynamic of the upper limb;
- Improving muscle tone flexors, extensors, pronators and supinators;
- Improving blood circulation and a local trophicity;
- Stimulation of tissue regeneration;
- Increased muscle strength and a resistance;
- Prevention of joint adhesions;
- Quick return to activities every day.

"The physiotherapy procedure approaches the treatment of epicondylitis in three stages, progressively depending on the clinical condition of the disease.

In the acute phase, it aims to relieve pain, prevent inflammation and combat muscle hypotrophy. Physical therapy introduces movements to increase mobility and flexibility in the fist and elbow (flexion and extension movements), exercises for maintaining tone and muscle strength through isometric contractions

aimed at flexion, elbow and fist extension, as well as pronation and supination exercises [6].

In the subacute phase, the objectives of kinetic treatment are: maintaining flexibility, increasing muscle strength and endurance, restoring functional activities and returning to activity.

Gradually, physical therapy introduces higher intensity exercises as well as more demanding activities or even sports activities. Usually, recovery treatment lasts a long time (about 6-9 months) and only after this interval can it be specified whether surgical treatment is needed or not.

There is currently no specific treatment based on scientific studies for this condition. Both movement or rest therapy as well as the surgical approach has few benefits, none of these therapies have been scientifically verified.

Non-surgical therapy is the most common form of treatment and unanimously the most accepted. Following this therapy, the full functionality of the tendon and muscle unit is regained.

The recommended treatment is to put the affected segment to rest and avoid activities that exacerbate the condition.

The use of "counterforce" bands (bands worn distally from the elbow, over the most voluminous part of the forearm muscles), intended to reduce the forces transmitted to the elbow during the effort, is not an adequate alternative to rest.

Drug treatment with nonsteroidal anti-inflammatory drugs is effective in milder cases. It can be said that successful therapy depends to a large extent on the healing process and the will of the patient. Thus, the absence of pain both at rest and after muscle and tendon stress characterizes the full integrity of neural structures, proper blood circulation in these areas and the stable structure of collagen fibres.

Symptoms that persist for more than two weeks after conservative treatment usually respond to corticosteroid and lidocaine infiltrations in the affected epicondyle region.

After the remission of the pain, the patient can start a physiotherapy program, with the daily execution of the tendons of the flexor and extensor muscles. The healing process is achieved by gradually increasing the tension and tension. Thus, exercise should include more improvement in flexion, strength and proper bending of the radiocarpal joint, elbow, shoulder and forearm.

Exercise is usually performed until the onset of pain (this being the most important indicator for the progressive increase and decrease of stretching). The most demanding movement for the tendon is the eccentric stretch [9].

4.1. Functional limitation

Limiting the possibilities of movement and reducing the efficiency at loading are late symptoms and typical of the worst forms; where in such cases the appearance of an articular effusion is relatively frequent, the painful symptomatology being able to acquire the characteristics of the inflammatory forms with pain even in rest.

The functional balance must highlight:

- pain control;
- mobility changes, and stability;
- muscle changes.

a) *The pain control* - "does not exist instruments capable of measuring pain. Everyone has a standard and a perception

of pain. Its evaluation, therefore, is done paying attention to the description of the pain that the patient communicates to the doctor. The intensity is evaluated as mild, moderate, strong, atrocious, to severe.

However, there is an "analog" system (visual and numerical), very useful, in which the pain is represented by a straight line of 10 cm that joins two numbered points - 0 at the beginning and 10 at the end - which symbolizes the lack of pain and respectively maximum pain imaginable, figure 1" [11].

Fig. 1. *Visual analog Scale* (VAS)

The analog visual scale (VAS) is the visual representation of the amplitude of pain that a patient thinks he is experiencing. This scale can take many forms, both as a pain scale and as a pain relief scale. The amplitude is represented by a line, usually 10 cm long, with or without notches next to each centimetre.

The optimal length for measuring pain seems to be 10 cm. One end indicates no pain, while the other is the strongest pain imaginable. The scale is completed by the patient, who is asked to draw a sign on the line that represents the level of pain felt. The distance measured in millimetres, starting from the end that indicates the absence of pain, is the measurement of the special way of quantification [11].

b) *The articular balance*, figure 2, must highlight the presence of physiological mobility (active flexion, active extension, active pronation and active supination) and reduced mobility, the presence of abnormal movements.

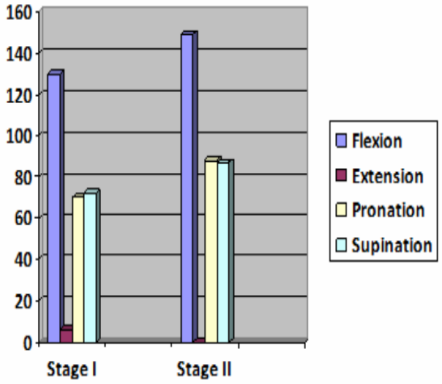

Fig. 2. *Joint balance evolution*

c) *The muscle balance*, Table 1, must analyze the strength of all muscle groups. Aspects regarding painful contractions in the arm will be highlighted.

Table 1

The muscle balance

Flexion	The Biceps Brahial muscle	f3	f4	f5
	The Brachial Anterior muscle	f2	f3	f5
	The Brahioradial muscle	f4	f4	f5
Extension	The Brachial Triceps muscle	f3	f4	f5
	The Anconeu muscle	f4	f4	f5
Pronation	The Round muscle	f2	f2	f4
	The Pronator square muscle	f3	f4	f5
Supination	The Schort Supinator muscle	f3	f4	f5

4. Discussions

The prognosis of patients with epicondylitis depends very much on the evolution of the disease before the presentation to the doctor and the start of therapy. If the condition has progressed, there is a risk that the patient's life will be greatly affected by the disease because movements in one of the most important joints of the body are limited.

The objectives of the physical therapy in functional recovery are achieved through its basic means, physical exercise.

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